Amendments to the Specification:

Please add the following new paragraph and heading immediately above "**BACKGROUND OF THE INVENTION**" on page 2:

STATEMENT OF GOVERNMENT RIGHTS

[000.1] This invention was made with United States Government support under 70NAHB8H4023 awarded by National Institute of Standards and Technology (NIST).

Please replace paragraph [004] with the following amended paragraph:

[004] Figure 1 illustrates a typical long-wavelength VCSEL 10 having a tunnel junction. As shown, an n-doped InP substrate 12 has an n-type electrical contact 14. An n-doped lower mirror stack 16 (a DBR) is on the InP substrate 12, and an n-type graded-index InP lower spacer 18 is disposed over the lower mirror stack 16. An InGaAsP or AlInGaAs active region 20, usually having a number of quantum wells, is formed over the InP lower spacer 18. Over the active region 20 is a tunnel junction [[21]] 25. Over the tunnel junction [[21]] 25 is an n-type graded-index InP top spacer 22 and an n-type InP top mirror stack 24 (another DBR), which is disposed over the InP top spacer 22. Over the top mirror stack 24 is an n-type conduction layer 9, an n-type cap layer 8, and an n-type electrical contact 26.

Please replace paragraph [006] with the following amended paragraph:

[006] In operation, an external bias causes an electrical current 21 to flow from the electrical contact 26 toward the electrical contact 14. The insulating region 40 and the conductive central opening 42 confine the current 21 such that the current flows through the conductive central opening 42 and into the tunnel junction [[21]] 25. The tunnel junction converts incoming electrons into holes that are injected into the active region 20. Some of the injected holes are converted into photons in the active region 20. Those photons bounce back and forth (resonate) between the lower mirror stack 16 and the top mirror stack 24. While the lower mirror stack 16 and the top mirror stack 24 are very good reflectors, some of the photons leak out as light 23 that travels along an optical path. Still referring to Figure 1, the light 23 passes through the

conduction layer 9, through the cap layer 8, through an aperture 30 in electrical contact 26, and out of the surface of the vertical cavity surface emitting laser 10.

Please replace paragraph [009] with the following amended paragraph:

[009] Another problem, which is addressed by the tunnel junction [[21]] 25, is optical loss. In long wavelength VCSELs it is often critical to limit optical losses. To that end, p-doped materials, which absorb more light than n-doped materials, are replaced by n-doped materials and the tunnel junction [[21]] 25. That junction converts holes into electrons that are injected into the active region.